3 PAPERS

# CBSE-PMT 2009

MAINS Special

APRIL 2009 | Rs. 25

# MT BIOLOGY TODAY

India's No.1 Biology Monthly for Medical Entrance Exams

www.mtg.in

HIGH YIELD TERM
Human Evolution

BIOBASICS
Cell - The Unit of Life - II

Examiner's Mind
BOTANY : The Living World
ZOOLOGY : Structural Organisation in Animals

ASSERTION & REASON
Botany : Genes & Chromosomes
Zoology : Drug and Alcohol Abuse

ust of more than
1 Crore readers
since 1982

MTG Learning Media

MATHEMATICS TODAY
PHYSICS FOR YOU
CHEMISTRY TODAY
BIOLOGY TODAY
CURRENT CURRENTS

MODEL TEST PAPER
AFMC 2009

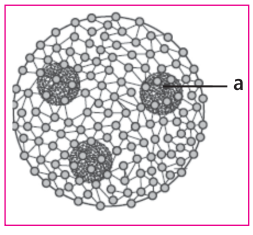
HIGH YIELD FACTS
BOTANY : Class XI : Nutrition in Plants - II
Class XII : Genetic Engineering
ZOOLOGY : Class XI : Phylum Annelida

# CBSE-PMT MAINS 2009

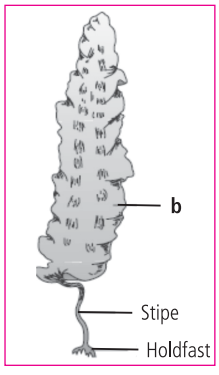
# Veri-Similar Practice Paper-1

*– Prof. Siddharth Sanghvi*

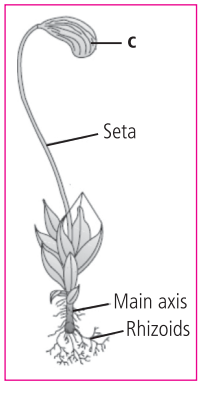
**1.** Identify the following structures (A, B, C, D, E) and parts (a, b, c, d, e) associated with them?



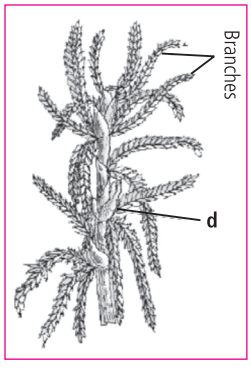

(A)



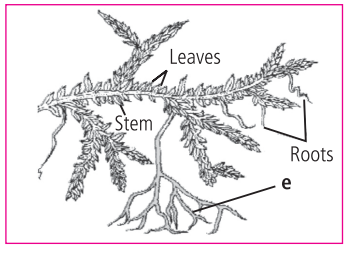

(B)




(C)



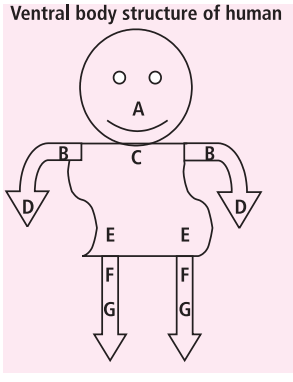

(D)



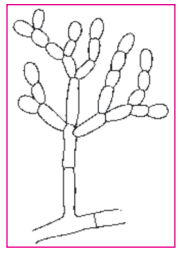

(E)

**2.** The given box represents different bones of different location in humans. The diagram represents a human ventral body segments A-G. Put the appropriate bone in A-G segment on the basis of their location.

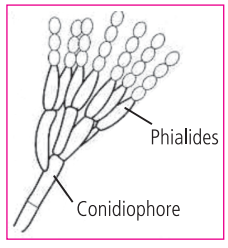
| | | | |
|---|---|---|---|
| 1. | vertebral column | 2. | sternum |
| 3. | two articulation surfaces of ribs | 4. | frontal |
| 5. | mandible | 6. | scapula |
| 7. | clavicle | 8. | ilium, ischium and pubis. |
| 9. | carpals | 10. | femur |
| 11. | patella | 12. | tarsal |
| 13. | metatarsal | 14. | calcaneus |



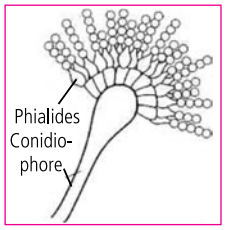

**3.** The following diagrams show some representative methods of conidium production in mitosporic fungi. Identify the name of fungi.



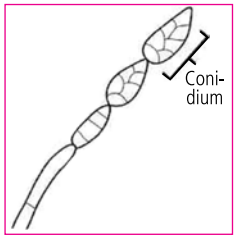
(A)




(B)

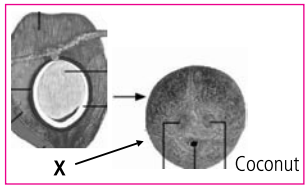



(C)

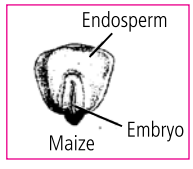



(D)

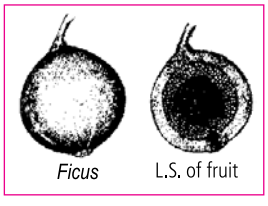
**4.** Give the answers of following questions on the basis of given diagrams.



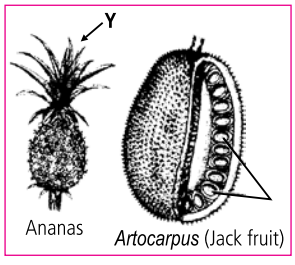

(A)



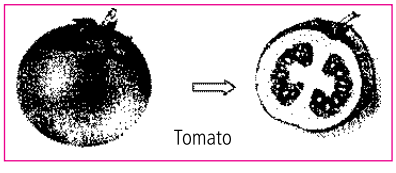

(B)




(C)




(D)




(E)

(a) Write the type of fruit in A and structure X representing ..... .
(b) Write the type of fruit in B and ploidy level of aleurone layer in maize is ..... .
(c) Write the type of fruit and inflorescence in C.
(d) Write the type of fruit in D and identify Y.
(e) Write the type of fruit in E and write the name of genetically modified tomato.

**5.** Fill in the blanks from given options.
peptones, malic acid, thigmonastic, seismonasty, sucrose, epinasty, hyponasty.
(a) Greater growth on the abaxial side is called ..... and on the adaxial side is called ..... .
(b) Irreversible opening of flowers during blossoming is caused by ..... growth. Closing of flowers is due to….. growth.
(c) Bending of tentacles in sundew or *Drosera* after coming in contact with an insect is ..... movement of variation.
(d) The leaves of sensitive plant *Mimosa pudica* (touch me not) show ..... .
(e) Spermatozoids show chemotaxis towards ..... and ..... in archegonia of moss and fern respectively.
(f) Bacteria are attracted towards ..... .

**6.** Match column A with column B.

| Column A | | Column B | |
|---|---|---|---|
| 1. | Albumins | (a) | Soluble in water and are storage in nature |
| 2. | Globulins | (b) | Leucosin from wheat |
| 3. | Glutelins | (c) | Ricin from castor seeds |
| 4. | Prolamines | (d) | Insoluble in water but soluble in 5% NaCl solution |
| 5. | Scleroprotein | (e) | Arachin in groundnuts |
| | | (f) | Insoluble in water and soluble in weak acids/alkalies |
| | | (g) | Oryzenin in rice |
| | | (h) | Insoluble in water and soluble in 70% alcohol |
| | | (i) | Hordein in barley |
| | | (j) | Salmin in sperms of salmon fish |
| | | (k) | Insoluble in water and soluble in strong acids/alkalies |
| | | (l) | Fibroin and sericin from silk. |

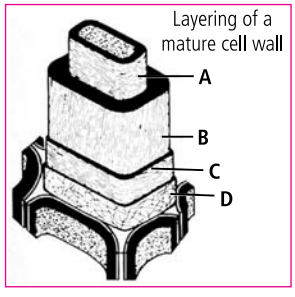
**7.** Select five true statements.
(a) Catecholamines stimulate the breakdown of glycogen resulting in an increased concentration of glucose in blood.
(b) Glucocorticoids stimulate gluconeogenesis, lipolysis and proteolysis; and inhibit cellular uptake and utilisation of amino acids.
(c) Glucocorticoids, particularly cortisol, produces antiinflammatory reactions and suppresses the immune response.
(d) Ovary produces two groups of steroid hormones called androgen and testosterone.
(e) Estrogens produce wide ranging actions such as stimulation

of growth and activities of female secondary sex organs, development of growing ovarian follicles, appearance of female secondary sex characters (*e.g.*, high pitch of voice, etc.), mammary gland development .

(f) Progesterone supports pregnancy. Progesterone also acts on the mammary glands and stimulates the formation of alveoli (sac-like structures which store milk) and milk secretion.

**8.** Give the answers of following questions.

(a) Write the name of protein present in primary cell wall.
(b) Write the components of primary cell wall.
(c) Write the compostion of macrofibril of cell wall.
(d) Write the orientation of fibrils in primary cell wall.
(e) Identify part A, B, C, D.




**9.** Give the answers of following questions.

(a) Number of chromosome groups at each equatorial plate of metaphase I of a plant having 2n = 60 chromosome, will be?
(b) How many times a cell should divide to produce 128 cells?
(c) How many number of mitotic division required to produce 128 cells?
(d) An egg cell has 5 pg of DNA in its nucleus. How much amount of DNA will be in this animal at the end of G2 phase mitosis ?
(e) For producing 100 seeds we require how many meiosis?

**10.** Match column A with column B.

| Column A | | Column B | |
|---|---|---|---|
| 1. | AUG codon | a | Feature of eukaryotic mRNA |
| 2. | Polycistronic mRNA | b | Induced by proflavin dyes |
| 3. | snRNP | c | Part of *E. coli* RNA polymerase holoenzyme |
| 4. | Inosine | d | Product of operon transcription |
| 5. | AGGAGGU | e | DNA binding site for RNA polymerase |
| 6. | -Methyl guanosine | f | Component of spliceosome |
| 7. | Sigma factor | g | Shine-Dalgarno sequence |
| 8. | TATA box | h | Used to attached at 16S r-RNA |
| 9. | UAA | i | Nucleotide found in tRNA anticodons |
| 10. | UAG | j | Start signal for translation |
| | | k | Used to attached at 18S r-RNA |
| | | l | Amber |
| | | m | Termination codon |

**11.** Fill in the blanks with the name of grasslands.

(a) North America: the ..... of the central lowlands and high plains of the US and Canada.
(b) Eurasia: the ..... from Ukraine eastward through Russia and Mongolia.
(c) South America: the ..... of Argentina and Uruguay
(d) Africa: the ..... in the Republic of South Africa.
(e) The ..... of Hungary.

**12.** Match column A with column B.

| Column A | | Column B | |
|---|---|---|---|
| 1. | Rat flea | (a) | *Sepia* |
| 2. | Silver fish | (b) | *Limax* |
| 3. | Scorpion | (c) | *Lepisma* |
| 4. | Cuttle fish | (d) | *Xenopsylla cheopsis* |
| 5. | Grey slug | (e) | *Palamneus* |

**13.** Define the following terms.

(a) Sanguivorous
(b) Benthos
(c) Anadramous
(d) Cannibals
(e) Metameric segmentation

**14.** Fill in the blanks.

(a) Severe constricting pain in the chest, often radiating to the left shoulder and arm and or to the jaw due to myocardial ischemia is called ..... .
(b) Communications between vessels, as between the smaller arteries that supply the heart muscle is called ..... . An increase in their size and number provides a collateral circulation to regions of the myocardium threatened with ischemia by gradual narrowing of a larger artery.
(c) A technique in which a catheter with a small balloon at the distal end is inserted into a diseased coronary artery. The balloon tip is inserted through the lesion and the balloon positioned at the center of the lesion. The balloon is then inflated with a solution of contrast material to allow visualization under fluoroscopy. The inflation of the

balloon compresses the atheromatous plaque against the side of the arterial wall, improving blood flow through the previously stenotic vessel. This technique is known as **..... .**

(d) The thin membrane which is the inner lining of the cardiac chambers is **..... .**

(e) The percentage of whole blood volume occupied by the red cells following centrifugation of blood is **..... .**

**15.** Match column A with column B

| Column A | | Column B | |
|---|---|---|---|
| 1. | Diaphragms, cervical caps and vaults | (a) | Devices are inserted by-doctors or expert nurses in the uterus through v gina. |
| 2. | Condoms | (b) | Developed by CDRI |
| 3. | Intra Uterine Devices | (c) | In male -'vasectomy' |
| 4. | Saheli | (d) | Reusable |
| 5. | Sterilisation | (e) | Barrier methods |
| | | (f) | Once a week |
| | | (g) | Non-steroidal preparation |
| | | (h) | CuT, Cu7, Multiload 375 |
| | | (i) | In female, -'tubectomy' |
| | | (j) | Nirodh |

**16.** Select the correct answer for the following statements from the given list (Items A to D may be used more than once).

A. Large intestine
B. pancreas
C. stomach
D. small intestine

1. Villi are present in this structure
2. Enterokinase is secreted by cells in this structure
3. Peyer's patches are present in the wall
4. Rugae may be present on the luminal surface
5. Sucrase, lactase and maltase are produced by cells in this structure
6. Haustra are typical features of this structure
7. *Taeniae coli* are present in this structure
8. Pepsinogen is produced by cells in this structure
9. Contains the islets of Langerhans
10. The cardia and fundus are regions of this structure
11. Parietal and chief cells are present in the walls
12. The jejunum is part of this structure
13. Aminopeptidase is produced by cells in this structure
14. Lipase is produced by cells in this structure
15. Ribonuclease and deoxyribonuclease are produced in this structure

**17.** Match column A with B

| Column A | | Column B | |
|---|---|---|---|
| 1. | Rotenone | (a) | Inhibits terminal electron transfer to oxygen, Complex IV |
| 2. | Antimycin A | (b) | Inhibits complex I, rat poison and insecticide. |
| 3. | Cyanide. | (c) | Inhibits cytochrome oxidase by competing with an oxygen- binding site, Complex IV. |
| 4. | Carbon Monoxide | (d) | Bind protons, are hydrophobic and can dissipate a pH gradient by equilibrating $H^+$ |
| 5. | Uncouplers | (e) | An antibiotic which blocks complex III. |

**18.** Select true and false statements

(i) There are 12 pairs of ribs. Each rib is a thin flat bone.

(ii) It has two articulation surfaces on its ventral end and is hence called bicephalic.

(iii) First seven pairs of ribs are called true ribs.

(iv) Ventrally, they are attached to the thoracic vertebrae and dorsally connected to the sternum with the help of hyaline cartilage.

(v) The 8th, 9th and 10th pairs of ribs do not articulate directly with the sternum but join the seventh rib with the help of elastic cartilage. These are called vertebrochondral (false) ribs.

(vi) Last 2 pairs (11 and 12th) of ribs are not connected dorsally and are therefore, called floating ribs.

(vii) Ribs and sternum together form the rib cage.

(viii) The bones of the limbs alongwith their girdles constitute the axial skeleton.

**19.** Give the answers of following questions

(i) Write the complete name of structure Z which is monosporic 7 celled and 8 nucleated

(ii) Write the name of structure A,B,C,D,E,F

(iii) Triple fusion is a result of fusion of part **.....** and **.....** and syngamy occurred due to fusion of part **.....** and **.....**

(iv) Write the name of X and Y end

(v) Write the name of growth factors required for pollen tube growth

**20.** Match the options of column A with column B

| Column A | | Column B | |
|---|---|---|---|
| 1. | Auxin | (a) | Associated with the breaking of apical dominance |
| 2. | Cytokinin | (b) | Thought to cause acidification of the cell wall |
| 3. | Gibberellin | (c) | Produced by the embryo of a cereal grain and moves to the aleurone layer |
| 4. | Abscisic acid | (d) | Application of this hormone to shoot cuttings will enhance the formation of roots |
| 5. | Ethylene | (e) | Delays senescence of leaves |
| | | (f) | Promotes the differentiation of vascular tissue |
| | | (g) | Prevents $K^+$ uptake by guard cells. |
| | | (h) | High levels of this hormone are produced during tomato fruit ripening. |
| | | (i) | induce epinasty |
| | | (j) | Richmond lang effect |
| | | (k) | 6-furfural aminopurine |
| | | (l) | Dormin |
| | | (m) | Avena curvature test |
| | | (n) | Bakane disease |
| | | (o) | Bolting |

## ANSWERS

**1.** A – coenobium of *Volvox*, a-daughter colony;
B – *Laminaria*, b-frond;
C – *Funaria*-gametophyte and sporophyte, c-capsule
D – *Sphagnum* gametophyte, d-archegonial branch
E – *Selaginella* sporophyte, e-rhizophore.

**2.** A-4. frontal 5. mandible, B-7. clavicle, C-2 sternum, D-9. carpals, E- 8. ilium, ischium and pubis, F-10. femur 11. patella, G-12. tarsal 13. metatarsal (Note --1. vertebral column. 3. two articulation surfaces of ribs 6. scapula 14. calcaneus, they all are present on dorsal side)

**3.** A – *Cladosporium*, B – *Penicillium*,
C – *Aspergilus*, D – *Alternaria*

**4.** (a) A-drupe, X-endocarp, (b) B-Caryopsis, 3n,
(c) C-syconus, hypanthodium, (d) D-sorosis, bulbils,
(e) E-berry, Flavr-Savr

**5.** (a) – hyponasty, epinasty, (b) – epinasty, hyponasty,
(c) – thigmonastic, (d) – seismonasty,
(e) – sucrose, malic acid, (f) – peptones.

**6.** 1 – (a, b, c); 2 – (d, e); 3 – (f, g); 4 – (h, i); 5 – (k, l)

**7.** a, b, c, e, f are true.

**8.** (a) Extensin and expansin.
(b) Matrix-hemicellulose & pectin, macrofibril-cellulose depositions.
(c) Macrofibril is made up of 250 microfibrils. Each microfibril is made up of 20 micelles. Each micelle is made up 100 cellulose chains. Each cellulose chain consists of 3000-6000 glucose units joined by β, 1-4 glycosidic bonds.
(d) In primary wall, the fibrils are short, wavy and loosely scattered.
(e) A-S3, B-S2, C-S1,D-primary wall, (here S stand for secondary wall).

**9.** (a) – 30; (b) – 7; (c) – 127; (d) – 20 pg; (e) – 125

**10.** 1 – (a, j); 2 – (d); 3 – (f); 4 – (i); 5 – (g, h);
6 – (a, k); 7 – (c); 8 – (e); 9 – (m); 10 – (l, m)

**11.** (a) prairies (b) steppes (c) pampas
(d) veldt (d) puszta

**12.** 1 – d; 2 – c; 3 – e; 4 – a; 5 – b

**13.** (a) Sanguivorous animal feed on blood.
(b) Benthos-those animal found living in the sea bottom but now used to describe organism of aquatic ecosystem that live associated with a substratum.
(c) Anadramous fishes – these marine fishes migrate from the sea into the estuaries for spawning, *e.g.*, salmon.
(d) Cannibals eat their fellows, such as cockroach.
(e) Metameric segmentation-segmentation where external division corresponds to internal division. The body is often divided both externally and internally into a number of segments or metameres.

**14.** (a) angina pectoris
(b) anastomoses (c) coronary angioplasty
(d) endocardium (e) hematocrit value

**15.** 1 – (e, d), 2 – (e, j), 3 – (a, h), 4 – (b, f, g), 5 – (c, i)

**16.** 1 - D, 2 - D, 3 - D, 4 - C, 5 - D, 6 - A, 7 - A, 8 - C, 9 - B, 10 - C,11 - C, 12 - D, 13 - D, 14 - B, 15 - B,

**17.** 1 - (b), 2 - (e), 3 - (a), 4 - (d), 5 - (c)

**18.** (i) True (ii) False (iii) True (iv) False (v) False (help of hyaline cartilage). (vi) False (ventrally) (vii) False (Thoracic vertebrae, ribs and sternum together form the rib cage.) (viii) False (appendicular skeleton).

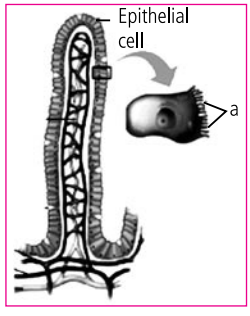
**19.** (i) Z-Polygonum type of embryo sac,
(ii) A - Antipodal cells, B - Polar nuclei, C - Central cells, D - Egg, E - Synergids, F - Filliform apparatus
(iii) Triple fusion -- B and P, Syngamy ----- D and P
(iv) X-Chalazal end, Y-Micropylar end
(v) Calcium and boron

**20.** 1-(b, d, f, m); 2-(a, e, j, k); 3-(c, n, o); 4-(g ,l); 5-(h, i)

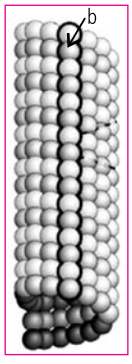
# CBSE-PMT MAINS 2009

# Veri-Similar Practice Paper-2

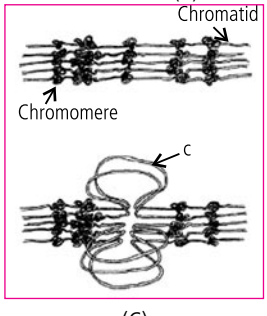
**1.** Identify the following structures (A, B, C, D, E) and their parts labelled as a, b, c, d and e.



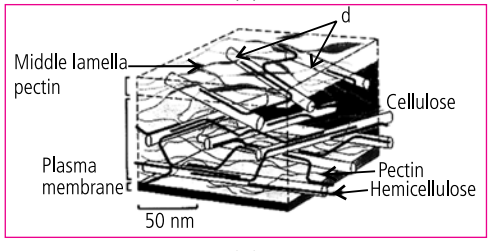

(A)




(B)

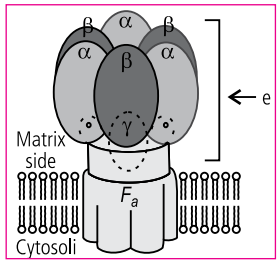



(C)




(D)

(E)




**2.** Match the column A with Column B

| S.N. | Column A (Phylum) | S.N. | Column B (Examples/ character) |
|---|---|---|---|
| (1) | Porifera | (a) | Coral |
| (2) | Cnidaria | (b) | Hook worm (*Ancylostoma*) |
| (3) | Platyhelminthes | (c) | Neptune's cup (*Poterion*) |
| (4) | Nemathelminthes | (d) | Liver flukes (*Fasciola*) |
| (5) | Annelida | (e) | Dead man's finger (*Chalina*) |
| | | (f) | Sea mouse (*Aphrodite*) |
| | | (g) | Planaria |
| | | (h) | Pin worm (*Enterobius*) |
| | | (i) | *Sycon* |
| | | (j) | Polyp & medusa |
| | | (k) | *Aurelia* |

**3.** Fill in the blanks

(a) ---------- is a protein that prevent blood clotting. The gene encoding this protein was chemically synthesized. That gene was transferred into ---------- where this protein accumulates in the seed.

(b) In 1983, an American company named---------- prepared two DNA sequences corresponding to A and B chains of human insulin and introduced them in plasmids of -------- to produce insulin chains. Chains A and B were produced separately, extracted and combined by creating disulfide bonds to form human insulin.

**By : Prof. Siddharth Sanghvi, Indore**

(c) A west African plant named---------- produces a protein called ---------- which is approximately 2000 times as sweet as sugar.

(d) The transgenic GMO tomato called ---------- has a much longer and increased shelf life because of delayed ripening.This is achieved by reducing the amount of pectin of cell wall degrading enzyme ----------responsible for fruit softening.

(e) Golden rice is rich in ----------.

**4.** Match column A with column B

| S.N. | Column A | S.N. | Column B |
|---|---|---|---|
| (1) | *Australopithecus africanus* | (a) | *Sinanthropus* |
| (2) | *Homo habilis* | (b) | *Pithecanthropus* |
| (3) | *Homo erectus* | (c) | Brain capacity was about 1300-1600 c.c. |
| (4) | *Homo sapiens* neanderthalensis | (d) | Cro-Magnon man |
| (5) | *Homo sapiens fossilis* | (e) | Existed until about 1.5 million years ago |
| | | (f) | Peking man |
| | | (g) | Brain capacity was about 700 c.c. |
| | | (h) | It's a direct ancestor of the living man |
| | | (i) | Handy man |
| | | (j) | He lived in Africa about 2 million years ago |
| | | (k) | Appeared about 1.7 million year ago |
| | | (l) | He believed in immorality of soul |
| | | (m) | "Lucy" |
| | | (n) | African Ape man |
| | | (o) | Brain capacity was about 1650 c.c. |
| | | (p) | Most numerous from about 1,00,000 years ago. |
| | | (q) | Gave rise to *Homo habilis* |
| | | (r) | Tuang baby |
| | | (s) | Brain capacity was about 500 c.c. |
| | | (t) | First tool maker |

**5.** Write the name of pollination mechanism / pollination type / pollinator relationship/ name of pollinator (whatever is applicable ) for the given plants.

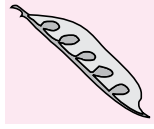
| S.N. | Plants name | S.N. | Pollination mechanism/ pollination type/ pollinator relationship |
|---|---|---|---|
| (1) | *Ficus species* | (a) | Name of pollinator → |
| (2) | *Aristolochia* | (b) | Pollination mechanism → |
| (3) | *Salvia* | (c) | Pollination mechanism → |
| (4) | *Yucca* & *Tageticula* | (d) | Pollinator relationship → |
| (5) | *Anthocephalus* | (e) | Pollination type → |

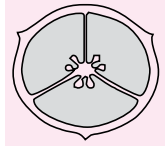
**6.** Select name of joint from column I and match with examples from column II.

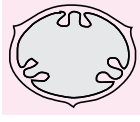
| S.N. | Column I | S.N. | Column II |
|---|---|---|---|
| (1) | Ball and socket joint | (a) | Atlas and axis |
| (2) | Hinge joint | (b) | Between the carpals |
| (3) | Pivot joint | (c) | Humerus and pectoral girdle |
| (4) | Gliding joint | (d) | Between carpal and metacarpal of thumb |
| (5) | Saddle joint | (e) | Knee joint |

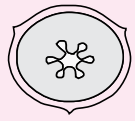
**7.** Column alpha represents the placentation in different plants. Match the items of column beta, gamma, lambda (mention the number) with column alpha (Diagrams)

**Column alpha-Diagrams**

(a) 

(b) 

(c) 

(d) 

(e) 

**Column beta-Name**

(1) Axile
(2) Free central
(3) Basal
(4) Marginal
(5) Parietal

**Column gamma-Feature**

(6) Placenta forms a ridge along the ventral suture of the ovary and the ovules are borne on this ridge forming two rows.

(7) When the ovules are borne on central axis and septa are absent

(8) The placenta develops at the base of ovary and a single

ovule is attached to it

(9) When the placenta is axial and the ovules are attached to it in a multilocular ovary.

(10) The ovules develop on the inner wall of the ovary or on peripheral part. Ovary is one-chambered but it becomes two chambered due to the formation of the false septum.

**Column lambda**

| | |
|---|---|
| (11) china rose | (12) *Argemone*. |
| (13) *Dianthus* | (14) *Primrose* |
| (15) mustard | (16) pea. |
| (17) tomato | (18) lemon |
| (19) sunflower | (20) marigold. |

**8.** Select true and false statements

(a) Cerebrospinal fluid (CSF) is produced by choroid plexus.

(b) Cerebrospinal fluid (CSF) flows from the brain ventricles to the subarachnoid space.

(c) Cerebrospinal fluid (CSF) acts as a fluid shock absorber in the subarachnoid space.

(d) The volume of CSF contained in the nervous system is approximately four (4) times the volume of CSF that is produced per day.

(e) In order to flow from the third ventricle to the fourth ventricle,CSF flows through the cerebral aqueduct.

(f) A "ridge" on the surface of the brain is called a gyrus.

(g) Motor areas are concentrated in the anterior part of the cerebrum.

(h) During complex voluntary movements, the medulla provides corrective feedback for maximum coordination.

(i) In most individuals, the speech areas are located in the right cerebral hemisphere.

(j) Vagus nerve provides some innervation to the heart, lungs and upper abdominal organ.

**9.** Fill in the blanks (Combo) (Select examples from given other blanks fill with your own choice)

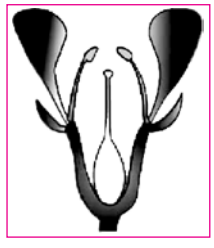
*Rhynia, Psilotum, Selaginella. Osmunda, Marsilea, Pteris, Dryopteris*

The stele of stem is connected to that of stele of leaf by a vascular connection called .....(1)..... It produces a break in vascular cylinder called .....(2)..... The simplest and most primitive type of stele is .....(3)..... which is a solid stele having smooth core of xylem with no medulla (pith) *e.g.*, .....(4)..... .

From this stele, siphonostele (stele with pith hence also called medullated protostele) originated. It may be ectophloic siphonostele (phloem outer of xylem) *e.g.*, .....(5)..... Amphiphloic siphonostele, (phloem on both outer and inner of xylem) e.g., .....(6)....., solenostele (stele with non over lapped leaf gaps) and dictyosteles originated. In dicyostele the stele is dissected into many .....(7)..... due to overlapped leaf gaps. Each meristele is just like protostele *e.g.*, rhizome of ferns .....(8)..... Sometimes, there are two or more rings of meristeles in a dictyostele. This condition is called .....(9)..... stele. In gymnosperms and dicot angiosperms, stele is called .....(10)..... that has many vascular bundles arranged in a ring. In monocot angiosperms, vascular bundles are scattered in ground tissue. This type of stele is called .....(11).....

**10.** For the given flowers a,b,c,d, select the correct applicable information from boxes and make a complete answer(write the no.or alphabet of box in your answer)

(a)



(b)

(c)

(d)

| Type of flowers | Position of ovary | Examples |
|---|---|---|
| X. Epigynous<br>Y. Perigynous<br>Z. Hypogynous | P. Half inferior<br>Q. Inferior<br>R. Superior | 1. plum, 2. rose, 3. peach, 4. guava<br>5. cucumber, 6. the ray florets of sunflower<br>7. mustard, 8. china rose 9. brinjal |

**11.** Give the answers of following questions on the basis of given diagram and your knowledge

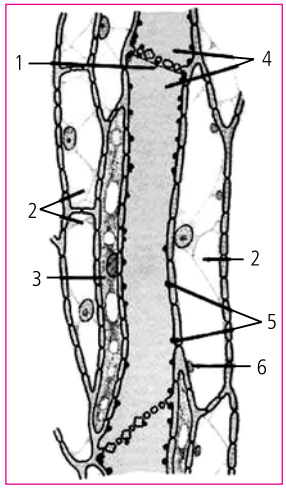
(a) What is leptome, and the term leptome was given by .....?

(b) Identify the part 1-5.

(c) Write the name of material deposited in part 6, also mention the glycosidic linkage ?

(d) What is slime plugs? It is deposited at which part .....?

(e) In place of companion cell gymnosperm have .....




**12.** Match column I with column II

| S.N. | Column I | S.N. | Column II |
|---|---|---|---|
| (1) | Vitamin A | (P) | Heips in the absorption and utilization of iron by converting the inorganic ferric iron to the ferrous form |
| (2) | Vitamin $B_9$ | (Q) | Best source-cod liver oil |
| (3) | Vitamin C | (R) | First fat soluble vitamin to be discovered |
| (4) | Vitamin D | (S) | Best source-cod liver oil and synthesis of this vitamin needs ultraviolet light |
| (5) | Vitamin E | (T) | Anti infection |
| | | (U) | Tocopherols |
| | | (V) | It is essential for growth and formation of red blood corpuscles |
| | | (W) | Daily requirement - 50 mg. |
| | | (X) | It helps in DNA synthesis |
| | | (Y) | Best source-vegetable oils |
| | | (Z) | It maintains the normal functioning of parathormone |

**13.** Give the answers of following questions :

(i) Note the location of the parathyroid glands and describe the hormonal control of calcium homeostasis.

(ii) Distinguish between alpha and beta cells in the pancreas and explain how their antagonistic hormones (insulin and glucagon) regulate carbohydrate metabolism.

(iii) Distinguish between type I diabetes mellitus and type II diabetes mellitus.

(iv) List the hormones of the adrenal medulla, describe their functions.

(v) List the hormones of the adrenal cortex, describe their functions.

(vi) List the hormones hormone of steroid categories produced by the gonads.

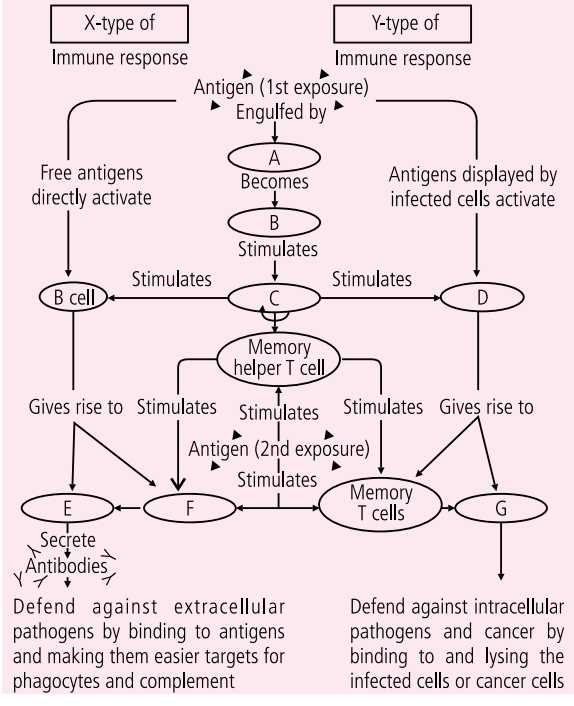
**14.** The flow chart shows some of the stages involved in the immunological response to an antigen.

(a) What is an antigen?

(b) Name (i) Type X & (ii) Type Y immune responses.

(c) Identify A-F

(d) Influenza and measles are diseases caused by viruses. The viruses have antigens on their surface. Use your knowledge of antigens and antibodies to suggest why a person may have influenza several times, but usually has measles only once.




**15.** Given information is about sexual reproduction in *Rhizopus*. Fill the blank places

*Rhizopus stolonifer* is .....(1)..... with two mating types, +ve and -ve. When the mycelia of both the mating types are present in the same medium, they produce .....(2)..... by the .....(3)..... reaction, which stimulate the mycelia to form special types of subaerial hyphae called .....(4)..... which in the region of contact produces a club shaped outgrowth called .....(5)..... due to the .....(6)..... reaction. Both the opposite strained structure 5 remain in contact at their terminal ends and each of them is multinucleate and aseptate,

hence is also called a .....(7)..... . The terminal swollen part is distinguished as a .....(8)....., by the laying down of a septum at its base, due to which suspensor is formed. The protoplast of it behaves as a .....(9)..... The contact wall between the two dissolved due to which the cytoplasms of two fuse together. The opposite strained nuclei come pair together. The paired nuclei fuse together to form diploid nuclei (karyogamy) as a result of which a diploid multinucleate structure called .....(10)..... is formed. This secretes a hard wall around itself to form a resting spore called .....(11)..... which is a dark brown or black .This method of sexual reproduction in *Rhizopus* is called .....(12)..... .

**16.** Fill in the blanks

(i) Forest cover in india is .....% of land in India, which is less than .....% area recommended by the national forest policy for plains.

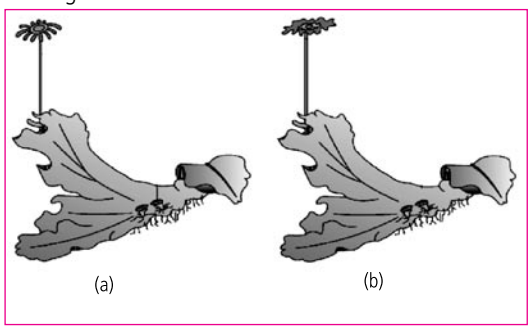
(ii) ..... involves growing agricultural crops between rows of planted trees.

(iii) ..... involves felling and burning of forest followed by cultivation of crops for few years and abandonig cultivation to allow forest growth.

(iv) Economically important fish can be grouped into two categories,namely ..... fish found at the sea bottom, and ..... fishes floating free in water column.

(v) Gasoline mixed with .....% ethanol can be used as conventional gasoline engines.

**17.** Give the answers of following questions on the basis of given diagram




(i) Identify the given structure a & b

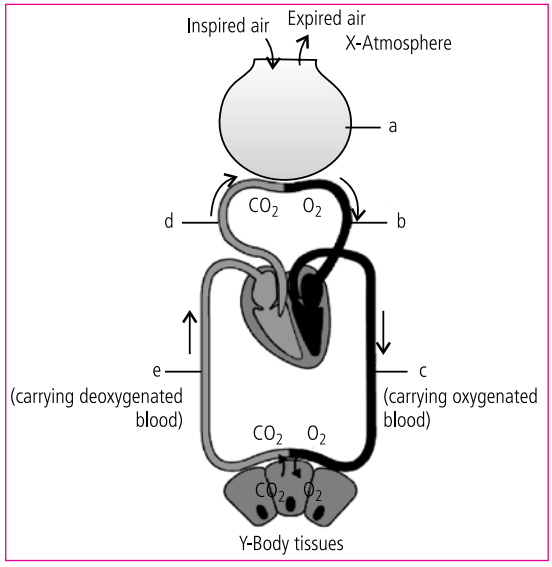
(ii) Rhizoids present on which surface of this bryophyte?

(iii) Write the name of the structure required for vegetative reproduction in given diagram

(iv) How many no.of NCC are present in this bryophyte?

(v) Write the name of structure responsible for spore dispersal.

**18.** Given diagram represents fusion of respiratory and circulatory systems of human. Refer the diagram and give the answers of following questions




(i) Write the name of structure a, b, c, d, e

(ii) Write the partial pressure of $O_2$ and $CO_2$ at position X, Y & structure a, c, e

(iii) Write the structure involved in systemic circulation

(iv) Write the structure involved in pulmonary circulation

(v) The solubility of $CO_2$ is ..... times higher than that of $O_2$.

**19.** Fill in the blanks

(i) Erythrocytes, leucocytes and platelets are collectively called ..... and they constitute nearly ..... per cent of the blood.

(ii) Erythrocytes or red blood cells (RBC) are the most abundant of all the cells in blood. A healthy adult man has, on an average, ..... millions to ..... millions of RBCs mm-3 of blood.

(iii) RBCs are formed in the ..... in the adults. RBCs are ..... in shape.

(iv) A healthy individual has ..... gms of haemoglobin in every 100 ml of blood.

(v) RBCs have an average life span of ..... days after which they are destroyed in the ..... (graveyard of RBCs).

(vi) Leucocytes are also known as white blood cells (WBC). They are nucleated and are relatively lesser in number which averages ..... $mm^{-3}$ of blood.

(vii) We have two main categories of WBCs – granulocytes and agranulocytes ..... are different types of granulocytes, while ..... are the agranulocytes.

(viii) ..... are the most abundant cells (60-65 per cent) of the total WBCs and ..... are the least (0.5-1 per cent) among them.

(ix) ..... and ..... (6-8 per cent) are phagocytic cells which destroy foreign organisms entering the body.
(x) ..... secrete histamine, serotonin, heparin, etc., and are involved in inflammatory reactions.
(xi) ..... (2-3 per cent) resist infections and are also associated with allergic reactions.
(xii) ..... (20-25 per cent) are of two major types – ..... and ..... forms. Both are responsible for immune responses of the body.
(xiii) Platelets also called ....., are cell fragments produced from ..... .
(xiv) Blood normally contains ..... platelets $mm^{-3}$. Platelets can release a variety of substances most of which are involved in the coagulation or clotting of blood.
(xv) A special case of Rh incompatibility (mismatching) has been observed between the Rh-ve blood of a pregnant mother with Rh+ve blood of the foetus. This condition is called ..... This can be avoided by administering ..... to the mother immediately

**20.** Fill in the blanks
(i) *E. coli* that has only ..... base pair compare with human whose diploid content is ..... base pair.
(ii) *E. coli* completes the process of replication within ..... minutes; that means the average rate of polymerisation has to be approximately ..... bp per second.
(iii) A ..... is defined as the functional unit of inheritance. promoter and terminator flank the ..... in a transcription unit.
(iv) RNA polymerase ..... is responsible for transcription of snRNAs (small nuclear RNAs) and the RNA polymerase ..... transcribes the heterogeneous nuclear RNA (hnRNA).
(v) In capping an unusual nucleotide ..... is added to the 5'-end of hnRNA. In tailing, ..... (200-300) are added at 3'-end in a template independent manner.

## ANSWERS

**1.** (A) Villi, (a) Microvilli, (B) Microtubule, (b) Protofilament,
(C) Polytene chromosome, (c) Puff or Balbiani rings
(D) Cell wall, (d) Macrofibrils
(E) Oxysome or $F_1$ - $F_0$ particles, (e) Head

**2.** (1)-(c, e, i), (2)-(a, j, k), (3)-(d, g), (4)-(b,h), (5)-(f)

**3.** (a) Hirudin, *Brassica napus*
(b) Eli Lilly, *E.coli*
(c) *Pentadiplandra brazzeana*, Brazzein
(d) Flavr Savr, polygalacturonase
(e) Vitamin A

**4.** 1 - (e, q, r, n, s, m); 2 - (g, t, l, j); 3 - (k, a, b, f, k)
4 - (c, l, p); 5 - (d, h, o)

**5.**

| S.N. | Plants Name | S.N. | Pollination mechanism/ pollination type/ pollinator relationship |
|---|---|---|---|
| (1) | *Ficus species* | (a) | Pollinator-Blastophaga wasp |
| (2) | *Aristolochia* | (b) | Trap mechanism |
| (3) | *Salvia* | (c) | Lever mechanism |
| (4) | *Yucca* & *Tageticula* | (d) | Obligate symbiotic relationship/Reciprocal symbiosis |
| (5) | *Anthocephalus* | (e) | Cheiropteriphily |

**6.** 1 - (c), 2 - (e), 3 - (a), 4 - (b), 5 - (d)

**7.** (a)-4-6-(16), (b)-1-9-(11,17,18), (c)-5-10-(12,15), (d)-2-7-(13,14), (e)-3-8-(19,20)

**8.** (a)-True, (b)-True, (c)-True, (d)-False, (e)-True, (f)-True, (g)-True, (h)-False, (i)-False, (j)-True.

**9.** 1-leaf trace 2-leaf gap. 3-haplostele (protostele) 4-*Rhynia*, *Psilotum*, *Selaginella*. 5-*Osmunda*. 6-*Marsilea* 7-meristeles 8- *Pteris*, *Dryopteris*. 9-polycyclic stele. 10-eustele 11-atactostele

**10.** (a)-Z-R-7,8,9, (b) & (c)-Y-P-1,2,3, (d)-X-Q-4,5,6.

**11.**
(a) Conducting part of pholem is known as leptome. (*i.e*-phloem-phloem fibers). Term was given by Haberlandt.
(b) 1 = inclined simple sieve plate; 2 = phloem parenchyma cells, 3 = companion cell; 4 = sieve tube members 5 = Sieve tube plastid
(c) Callose-a carbohydrate and it's a beta1-3 glucan.
(d) It's a deposition of P-protein over sieve areas and is called slime plugs. It is deposited at part 1
(e) Albuminous cell/Strasburger cell

**12.** 1 - (Q, R, T); 2 - (V, X); 3 - (P, W); 4 - (S, Z); 5 - (U, Y).

**13.** (i) Two pairs of endocrine glands situated behind, or embedded within the thyroid gland. Secrete PTH (parathyroid hormone) which raises blood levels of Ca ions, countering the action of calcitonin. Acts on bones to decompose and release Ca ions and on the kidneys to reabsorb Ca ions from the collecting tubules. Activates vitamin D, which acts as a hormone to stimulate Ca uptake from food.
(ii) Alpha cells secrete glucagons, which increases glucose levels in blood and beta cells produce insulin, which acts

to decrease glucose levels in the blood. Insulin decreases blood glucose by slowing glycogen breakdown in the liver and inhibiting the conversion of amino acids and glycerol (from fats) into sugar.

(iii) Type I diabetes – is an autoimmune disease, immune system attacks insulin-producing cells of pancreas, requires insulin shots.
Type II diabetes is reduced responsiveness to insulin due to changes in insulin receptors, occurs >40 yrs age, can be managed by exercise and dietary control.

(iv) Epinephrine and norepinephrine and other catecholamines control heart rate and stroke volume of heart, dilate bronchioles in lungs

(v) Glucocorticoids, suppress certain components of immune system.
Mineralcorticoids, major effects on salt and water balance.
Sex hormones - not well understood, may account for sex drive in females.

(vi) Androgens, estrogens, and progestins

**14.** (a) The antigen molecule is a which stimulates an immune response/antibody production. / glycoprotein / non-self protein.

(b) (i) X - Humoral or antibody mediated immune response
(ii) Y-Cell-mediated immune response

(c) A -,Macrophage B - Antigen presenting cell, C - Helper T-cell, D - Cytotoxic T-cell, E - Plasma cell, F - Memory B-cell

(d) Measles ---One antigen /unchanging; So one type of memory cell / So one type of antibody needed; Influenza ---- Several antigens /changing; so several types of memory cell /so many types of antibodies needed

**15.** 1 – Heterothallic 2 – Trisporic acids 3 – Telemorphic 4 – Zygophores 5 – progametangium. 6 – Thighmotropic 7 – coenoprogametangium. 8 – coenogametangium, 9 – coenogamete. 10 – coenozygote 11 – coenozygospore/ Zygospore. 12 – conjugation or gamentangial copulation.

**16.** (i) 19.4%, 33% (ii) Taungya system
(iii) Jhum cultivation (iv) Demersal, pelagic
(v) 10-20%

**17.** (i) - (a) *Marchantia* female thallus
(b) *Marchantia* male thallus
(ii) – Ventral (iii) – Gemma cup/Gemmae
(iv) --- 4-6 (v) – Elaters

**18.** (i) - a – alveolus,b-pulmonary vein, c – systemic arteries, d – pulmonary artery, e – systemic vein
(ii) a--$pO_2$ = 104mmHg, $pCO_2$ = 40mmHg
c--$pO_2$ = 95mmHg, $pCO_2$ = 40mmHg
e--$pO_2$ = 40mmHg, $pCO_2$ = 45mmHg
X- $pO_2$ = 159mmHg, $pCO_2$ = 0.3mmHg
Y--$pO_2$ = 40mmHg, $pCO_2$ = 45mmHg
(iii) c and e (iv) d, and a, b (v) >20-25 times

**19.** (i) Formed elements, 45
(ii) 5 to 5.5 millions (iii) red bone marrow, biconcave
(iv) 12-16 (v) 120, spleen
(vi) 6000-8000
(vii) Neutrophils, eosinophils and basophils///lymphocytes and monocytes
(viii) Neutrophils, basophils (ix) Neutrophils and monocytes
(x) Basophils (xi) Eosinophils
(xii) Lymphocytes, 'B' and 'T' forms.
(xiii) Thrombocytes, megakaryocytes
(xiv) 1,500,00-3,500,00
(xv) Erythroblastosis foetalis, anti-Rh antibodies

**20.** (i) 4.6 $\times 10^6$, 6.6 -6.9$\times$ $10^9$,
(ii) 38-40 ,1000-2000.
(iii) gene, structural gene
(iv) III, II
(v) (methyl guanosine triphosphate) or 7-methyl guanosine, adenylate residues or polyadenylate

**Prof. Siddharth Sanghvi**

Cell - 09425107550

Web - www.wxyz.in

Having experience of 11 years, he started teaching for medical entrance at the age of 17 years in 1997, that time he was himself a PMT aspirant. After cracking PMT he opted for teaching as a profession and now it has become a passion for him. He has worked with different institute of indore and kota in the span of 11 years as a faculty member of biology. Presently he is working with Rankers point as a HOD of Botany. His expert guidance has helped his student in securing TOP Ranks in different medical entrance